



5727

## GAS THYRATRON

7-PIN MINIATURE TETRODE TYPE

5727  
PREMIUM TYPE

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .  $6.3 \pm 10\%^*$  . . . . . ac or dc volts

Current . . . . . 0.6 . . . . . amp

Cathode:

Minimum heating time prior to  
tube conduction . . . . . 20 sec

Direct Interelectrode Capacitances

(Approx.):<sup>o</sup>Grid No.1 to anode. . . . . 0.026  $\mu\text{f}$ Grid No.1 to cathode, grid No.2,  
and heater. . . . . 2.4  $\mu\text{f}$ Anode to cathode, grid No.2,  
and heater. . . . . 1.6  $\mu\text{f}$ 

Ionization Time (Approx.):

For dc anode volts = 100, grid-  
No.1 volts (square-wave pulse) =  
50, peak anode amperes during  
conduction = 0.5. . . . . 0.5  $\mu\text{sec}$ 

Deionization Time (Approx.):

For dc anode volts = 125, dc anode  
amperes = 0.1, grid-No.1 resistor  
(ohms) = 1000, and grid-No.1 volts  
= -100. . . . . 35  $\mu\text{sec}$ For dc anode volts = 125, dc anode  
amperes = 0.1, grid-No.1 resistor  
(ohms) = 1000, and grid-No.1 volts  
= -10 . . . . . 75  $\mu\text{sec}$ 

Maximum Critical Grid-No.1 Current:

For anode-supply volts (rms) = 460,  
and average anode amperes = 0.1 . . . . . 0.5  $\mu\text{a}$ 

Anode Voltage Drop (Approx.). . . . . 8 volts

Grid-No.1 Control Ratio (Approx.)

with grid-No.1 resistor (megohms)  
= 0, grid-No.2 volts = 0. . . . . 250

Grid-No.2 Control Ratio (Approx.)

with grid-No.1 resistor (megohms)  
= 0, grid-No.2 resistor (megohms)  
= 0, grid-No.1 volts = 0. . . . . 1000

## Mechanical:

Operating Position. . . . . Any

Maximum Overall Length. . . . . 2-1/8"

Maximum Seated Length. . . . . 1-7/8"

Length, Base Seat to Bulb Top (Excluding tip). . . 1-1/2"  $\pm$  3/32"

Maximum Diameter. . . . . 3/4"

Dimensional Outline . . . . . See General Section

Bulb. . . . . T5-1/2

Base. . . . . Small-Button Miniature 7-Pin (JETEC No.E7-1)

\*,<sup>o</sup>: see next page.



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Basing Designation for BOTTOM VIEW . . . . . 7BN

Pin 1—Grid No.1

Pin 2—Cathode

Pin 3—Heater

Pin 4—Heater



Pin 5—Grid No.2

Pin 6—Anode

Pin 7—Grid No.2

## RELAY AND GRID-CONTROLLED RECTIFIER SERVICE

## Maximum and Minimum Ratings, Absolute Values:

*For anode-supply frequency of 60 cps*

## PEAK ANODE VOLTAGE:

Forward . . . . .	650 max.	volts
Inverse . . . . .	1300 max.	volts

## GRID-No.2 (SHIELD-GRID) VOLTAGE:

Peak, before tube conduction . . . . .	-100 max.	volts
Average <sup>■</sup> , during tube conduction . . . . .	-10 max.	volts

## GRID-No.1 (CONTROL-GRID) VOLTAGE:

Peak, before tube conduction . . . . .	-100 max.	volts
Average <sup>■</sup> , during tube conduction . . . . .	-10 max.	volts

## CATHODE CURRENT:

Peak . . . . .	0.5 max.	amp
Average <sup>■</sup> . . . . .	0.1 max.	amp
Fault, for duration of 0.1 second max. . . . .	10 max.	amp

## GRID-No.2 CURRENT:

Average <sup>■</sup> . . . . .	+0.01 max.	amp
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## GRID-No.1 CURRENT:

Average <sup>■</sup> . . . . .	+0.01 max.	amp
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## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . . . .	100 max.	volts
Heater positive with respect to cathode . . . . .	25 max.	volts

## BULB TEMPERATURE (At hottest point

on bulb surface) . . . . .	150 max.	°C
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AMBIENT TEMPERATURE . . . . .	-75 min.	°C
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## Typical Operation for Relay Service:

RMS Anode Voltage . . . . .	117	400	volts
Grid-No.2 Voltage . . . . .	0	0	volts
RMS Grid-No.1 Bias Voltage <sup>□</sup> . . . . .	5	-	volts
DC Grid-No.1 Bias Voltage . . . . .	-	-6	volts
Peak Grid-No.1 Signal Voltage . . . . .	5	6	volts
Grid-No.1-Circuit Resistance . . . . .	1	1	megohm
Anode-Circuit Resistance <sup>#</sup> . . . . .	1200	2000	ohms

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . .	10 max.	megohms
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\*,°,■,□, #: See next page.



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## PULSE-MODULATOR SERVICE

*For rectangular-wave shapes, duty cycle of 0.001 max.,  
pulse duration of 5  $\mu$ sec. max., and pulse-repetition  
rate of 500 pps max.*

## Maximum and Minimum Ratings, Absolute Values:

PEAK ANODE VOLTAGE:		
Forward . . . . .	500 max.	volts
Inverse . . . . .	100 max.	volts
GRID-No.2 (SHIELD-GRID) VOLTAGE:		
Peak, before tube conduction. . . . .	-50 max.	volts
Average, during tube conduction . . . .	-10 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Peak, before tube conduction. . . . .	-100 max.	volts
Average, during tube conduction . . . .	-10 max.	volts
CATHODE CURRENT:		
Peak. . . . .	10 max.	amp
Average . . . . .	0.01 max.	amp
Rate of change. . . . .	100 max.	amp/ $\mu$ sec
PEAK GRID-No.2 CURRENT. . . . .	0.02 max.	amp
PEAK GRID-No.1 CURRENT. . . . .	0.02 max.	amp
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	0 max.	volts
Heater positive with respect to cathode	0 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface). . . . .		
	150 max.	$^{\circ}$ C
AMBIENT TEMPERATURE . . . . .		
	-75 min.	$^{\circ}$ C

## Maximum and Minimum Circuit Values:

Grid-No.1-Circuit Resistance. . . . .	0.5 max.	megohm
Grid-No.2-Circuit Resistance. . . . .	25000 max.	ohms
	2000 min.	ohms

## CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

*Values are initial, unless otherwise specified*

	Note	Min.	Max.	
Heater Current. . . . .	1	540	660	ma
Grid-No.1 Supply Voltage for Tube Conduction (1) . . . . .	1,2	-2.9	-4.5	volts
Grid-No.1 Supply Voltage for Tube Conduction (2) . . . . .	1,3	-	-5.2	volts
Grid-No.1 Supply Voltage for Tube Conduction (3) . . . . .	4,3	-	-6.4	volts
Anode-Supply Voltage for Tube Conduction (1) . . . . .	1,5	-	38	volts
Anode-Supply Voltage for Tube Conduction (1) at 500 hours . . . .	1,5	-	50	volts
Anode-Supply Voltage for Tube Conduction (2) . . . . .	6,5	-	50	volts

\* ,  $\circ$  ,  $\square$  ,  $\#$  : See next page.

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	Note	Min.	Max.	
Anode-Supply Voltage for Tube Conduction (3) . . . . .	7,8	650	-	volts
RMS Grid-No.2 Supply Voltage for Tube Conduction (This voltage is 180° out of phase with anode-supply voltage). . .	1,9	1.9	3.3	volts
Heater-Cathode Leakage Current:				
Heater 25 volts positive with respect to cathode . .	1	-	15	μa
Heater 100 volts negative with respect to cathode . .	1	-	15	μa
Heater-Cathode Leakage Current at 500 hours:				
Heater 25 volts positive with respect to cathode . .	1	-	20	μa
Heater 100 volts negative with respect to cathode . .	1	-	20	μa
Leakage Resistance:				
Grid-No.2 to anode. . . . .	1,10	760	-	megohms
Leakage Resistance:				
Grid-No.2 to anode at 500 hours. . . . .	1,10	380	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With anode-supply volts (rms) = 460, grid-No.2 volts = 0, load resistor (ohms) = 3000, and grid-No.1 resistor (megohms) = 0.1.

Note 3: With anode-supply volts (rms) = 460, grid-No.2 volts = 0, load resistor (ohms) = 3000, and grid-No.1 resistor (megohms) = 10.

Note 4: With 7.0 volts ac or dc on heater.

Note 5: With grid-No.2 volts = 0, grid-No.1 volts = 0, load resistor (ohms) = 1000, and grid-No.1 resistor (megohms) = 0.1.

Note 6: With 5.7 volts ac or dc on heater.

Note 7: With 0 volts on heater.

Note 8: With grid-No.1 volts = -100, grid-No.2 volts = 0, and load resistor (ohms) = 10000.

Note 9: With anode-supply volts (rms) = 150, grid-No.1 supply volts (rms and in phase with anode-supply voltage) = 16.

Note 10: With grid-No.2 volts = ±380 with respect to anode and all other electrodes floating.

\* For pulse-modulator service, tolerance is +10%, -5%.

○ Without external shield.

■ Averaged over any interval of 30 seconds maximum.

□ Approximately 180° out of phase with the anode voltage.

\* Sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings.

## SPECIAL RATINGS AND PERFORMANCE DATA

## Shock Rating:

Impact Acceleration . . . . . 750 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in



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four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for heater-cathode leakage current, grid-No.1 supply voltage for tube conduction (I) and anode-supply voltage for tube conduction (II).

### Fatigue Rating:

Vibrational Acceleration. . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for heater-cathode leakage current, grid-No.1 supply voltage for tube conduction (I) and anode-supply voltage for tube conduction (II).

### Heater-Cycling Life Performance:

Cycles of Intermittent Operation. . . . 2000 min. cycles  
Under the following conditions: Heater volts = 7.5 cycled one minute on and one minute off, heater 100 volts negative with respect to cathode, and all other elements connected to ground.

### Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test a tube is considered inoperative if it shows a permanent or temporary short or open circuit.

### 1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that tubes have been properly stabilized. Conditions of life testing are specified under 500-hour intermittent life performance, except test run at room temperature. Tubes are initially read for grid-No.1 supply voltage for tube conduction (I). At the end of 1 hour, grid-No.1 supply voltage is read. The variation in the 0-hour and 1-hour readings will not exceed 15 per cent. Tubes must also meet established limits of grid-No.1 supply voltage.

### 100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Conditions of life testing are specified under 500-hour intermittent life performance, except test run at room temperature. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or



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temporary short or open circuit or fails to meet established limits of grid-No.1 supply voltage for tube conduction (1).

### 500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: Heater volts = 6.3, anode-supply volts (rms) = 460, grid-No.2 supply volts = 0, average anode milliamperes = 80, peak anode milliamperes = 500, grid-No.1 resistor (ohms) = 50000, and minimum bulb temperature (°C) = 150. At the end of 500 hours, tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass established initial limits of heater current, grid-No.1 supply voltage (1), and 500-hour limits for anode-supply voltage (1), heater-cathode leakage current, and leakage resistance shown under CHARACTERISTICS RANGE VALUES.

### OPERATING CONSIDERATIONS

Sufficient *anode-circuit resistance*, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

Curves shown under Type 2D21 also apply to the 5727